

REMARKS/ARGUMENTS

Favorable reconsideration of this application as presently amended and in light of the following discussion is respectfully requested.

Claims 1-4 and 6-28 are pending in the present application. Claim 1 has been amended by the present amendment. Claim 5 has been canceled without prejudice or disclaimer. Claims 21-28 are newly added, and support for the newly added claims is found in original Claims 7, 8, and 15-20. Additional support for newly added Claims 21 and 23-25 is found at page 18, lines 19 to page 19, line 8 and non-limiting Figure 8. It is respectfully submitted that no new matter is added by this amendment.

In the outstanding Office Action, the specification was objected to as not properly incorporating by reference the foreign priority document; Claims 1-7 and 9-15 were rejected under 35 U.S.C. § 102(e) as being anticipated by Saitoh et al. (U.S. Patent No. 6,693, 338, hereinafter Saitoh). Claims 8 and 16-20 were objected as being dependent upon a rejected base claim, but were indicated as allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Applicants thank the Examiner for the early indication of allowable subject matter in Claims 8 and 16-20. Accordingly, new Claim 22 corresponds to original Claim 17 rewritten in independent form including all limitations of the base claim and any intervening claims, and new Claims 26-28 correspond to original dependent Claims 18-20 and depend from new Claim 22. Therefore, it is respectfully submitted that new Claims 22 and 26-28 are in condition for formal allowance.

In response to the objection to the specification stated in paragraph 1 of the Office Action mailed May 21, 2004, it is respectfully submitted that the priority document is properly incorporated by reference according to M.P.E.P. §201.13(II)(G) stating "the incorporation by reference statement can be relied upon to permit the entering of a portion of

the foreign priority application into the U.S. application when a portion of the foreign priority application has been inadvertently omitted from the U.S. application, or to permit the correction of translation error in the U.S. application where the foreign priority application is in a non-English language.” Therefore, the specification is not currently amended, and it is respectfully submitted that this objection is traversed.

Briefly recapitulating, the power semiconductor device as in amended Claim 1 includes a first semiconductor layer and second semiconductor layer of the same conductivity type, “wherein an impurity concentration of the first semiconductor layer is lower than that of the second semiconductor layer; and a layer thickness ratio A is given by an expression:  $0 < A = t / (t+d) \leq 0.72$ , where t is a thickness of the first semiconductor layer, and d is a thickness of the second semiconductor layer.” Further, assuming that a breakdown voltage of the power semiconductor device as in amended Claim 1 “is represented by  $V_B$  (V), then t,  $V_B$  (V), and A satisfy a relationship below:

$$t < 2.53 \times 10^{-6} \times (A \times V_B)^{7/6} \text{ (cm).”}$$

By setting the thickness t of the first semiconductor layer according to the above relationship, the power semiconductor device attains an on-resistance lower than a conventional superjunction device as shown in Prior Art Figure 15 of the Applicants’ specification.

Saitoh discloses a power semiconductor device with a first semiconductor layer and second semiconductor layer of the same conductivity type. However, Saitoh does not disclose a power semiconductor device, wherein assuming that a breakdown voltage is represented by  $V_B$  (V), then t,  $V_B$  (V), and A satisfy the relationship  $t < 2.53 \times 10^{-6} \times (A \times V_B)^{7/6}$  (cm). In one example of Saitoh, the breakdown voltage is 600V, a thickness t of the first semiconductor layer is 39  $\mu\text{m}$ , and a thickness t of the second semiconductor layer is 10

$\mu\text{m}$ .<sup>1</sup> Applying these values to the relationship in amended Claim 1 results in A equal to 0.796, which is not less than 0.72, and therefore, does not satisfy the condition for A in amended Claim 1. Further, when A equal to 0.796 and a breakdown voltage  $V_B$  equal to 600V is applied to the relationship of amended Claim 1, the obtained value is 33.8  $\mu\text{m}$  which is smaller than the thickness  $t$  equal to 39  $\mu\text{m}$  as listed in Saitoh. Therefore the relationship  $t < 2.53 \times 10^{-6} \times (A \times V_B)^{7/6}$  is not satisfied.

A second example in Saitoh provides  $t$  equal to 13  $\mu\text{m}$  and  $d$  equal to 30  $\mu\text{m}$ .<sup>2</sup> In this example, a thickness ratio A equal to 0.302 is obtained. When these numbers as well as  $V_B$  equal to 600V are applied to the expressions of amended Claim 1 the result is  $t < 10.9 \mu\text{m}$ . However,  $t$  is given in the example as 13  $\mu\text{m}$ . Therefore, the expression,  $t < 2.53 \times 10^{-6} \times (A \times V_B)^{7/6}$ , is not satisfied. There is also a third example explained in Saitoh, with  $t$  equal to 26  $\mu\text{m}$  and  $d$  equal to 20  $\mu\text{m}$ . These values also fail to satisfy the expression in amended Claim 1. Therefore, Saitoh does not disclose the expression,  $t < 2.53 \times 10^{-6} \times (A \times V_B)^{7/6}$ , as in amended Claim 1. Therefore, Saitoh does not teach each and every element of amended Claim 1, and does not anticipate amended Claim 1. Therefore, it is respectfully requested that the rejection be withdrawn.

Likewise, it is respectfully submitted that Claims 2-4 and 6-20 which depend from amended Claim 1 are likewise allowable for at least the same reasons as discussed above with respect to amended Claim 1.

New Claims 21 and 23-25 correspond to the subject matter of original Claims 7, 8, 15, and 16. New Claim 21 is directed towards a power semiconductor device, "wherein insulating films are interposed every border regions between the second semiconductor layer and third semiconductor layers," as shown in non-limiting Figure 8. Saitoh discloses

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<sup>1</sup> Saitoh, column 11, lines 20-23.

<sup>2</sup> Saitoh, column 11, lines 28-29.

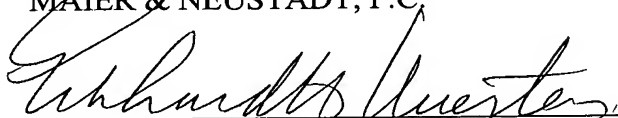
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insulating films 22 in Figure 8, but does not disclose insulating films interposed at every border between the second and third semiconductor layers. Therefore, new Claim 21 is also believed to be patentably distinguishable over Saitoh. Likewise, new Claims 23-25 which depend from new Claim 21 are believed to be patentably distinguishable over Saitoh, for at least the same reasons as discussed above with respect to new Claim 21.

Consequently, in view of the present amendment and in light of the above discussion, the application as amended herewith is believed to be in condition for formal allowance. An early and favorable action to that effect is respectfully requested.

Respectfully submitted,

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